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Computer-Aided Design AND APPLICATIONS

Intelligent Tourism Information Interaction Design and Service Strategy Based on SOM Clustering Algorithm

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Abstract. Developing the city's intelligent tourism service is an important way to speed up the city's economic construction and the only way to improve the tourism service system. As a individualized service, interactive system can actively push the content that users may be interested in, reducing the burden of users looking for needed information. In this text, a tourist attraction recommendation model based on SOM clustering algorithm and CAD is proposed to realize more individualized interactive design and service of intelligent tourism information, aiming at conforming to the principle of focusing on tourists' needs in intelligent tourism, enhancing tourists' autonomy and interaction in tourism activities, and providing tourists with convenient and individualized tourism information services. This model provides a intelligent tourism solution, which realizes the real-time sense of tourism environment, the integration of thematic information and the interaction of tourism management services. Intelligent tourism service is of great strategic significance for promoting the innovation-driven and sustainable growth of tourism.

Keywords: CAD; Interaction Design; Intelligent Tourism; Recommended Attractions
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1 INTRODUCTION

Intelligent tourism is developed from the concepts of intelligent city and intelligent earth, and it is an extended application in tourism. Using Markov chain to optimize and recommend travel routes based on user constraints is a random method. It uses the characteristics of Markov chain to design Stochastic matrix according to the constraints (such as budget, time, transportation mode, etc.) provided by users and the probability between tourist attractions. Ahmad et al. [1] used the transition probability matrix and initial probability values to iteratively calculate the probability distribution for each state. Based on the constraints provided by the user, select the eligible scenic spots from the probability distribution to generate the optimal travel route. Recommend the generated travel itinerary to users and optimize and adjust it based on user feedback. The travel

route optimization and recommendation method based on user constraints using Markov chain can effectively consider the user's needs and constraints, and generate travel routes that are more consistent with user expectations. At the same time, this method can also flexibly adjust and optimize according to different tourism scenarios and user needs, improving the quality of travel routes and user experience. Facing the vast information resources, it is becoming more and more difficult for users to actively obtain the content they really need, and people have to spend a lot of time and energy browsing the content they are interested in. Mohammad and Du [2] analyzed a collaborative tourism information search support online tourism planning system. The system should support multiple people to search and plan Travel itinerary at the same time, and be able to synchronize each person's search and planning results to facilitate communication and sharing between users. The system should be able to update tourism information in real time, including the opening status of scenic spots, traffic conditions, weather, etc., so that users can obtain the latest tourism information. The system should be able to analyze the results of user searches and planning, as well as the trends in tourism information, in order to better understand user needs and changes in the tourism market. When implementing ColTIS, we need to use some advanced technologies and tools, including search engine technology, Natural language processing technology, intelligent recommendation algorithm, cloud computing technology, etc. At the same time, it is also necessary to ensure the security, stability, and scalability of the system, in order to meet the simultaneous use of a large number of users and the continuous development of the system. Developing the city's intelligent tourism service is an important way to speed up the urban economic construction, and it is also the only way to improve the tourism service system. The on-site tourism planning support system based on dynamic information of tourist attractions is a system that utilizes mobile terminal technology and cloud computing technology to provide real-time and dynamic tourism information, help tourists plan tourism routes and activities on site, and improve tourism experience and satisfaction. Du et al. [3] provides on-site tourism planning services according to the needs and preferences of tourists, combined with real-time tourism information, including recommending the best route, activity arrangement, real-time navigation, etc. Interact and provide feedback to tourists through mobile terminal devices, such as providing voice guided tours, real-time information push, user reviews, etc., to improve the travel experience and satisfaction. Adopting data encryption to ensure data security and privacy, ensuring the security and privacy of tourist information are not violated. Through an on-site tourism planning support system based on dynamic information of tourist attractions, real-time and dynamic tourism information can be provided to help tourists better plan tourism routes and activities, improve tourism experience and satisfaction. At the same time, the system can also provide personalized services based on the needs and preferences of different tourists, providing important support and guarantee for the development and innovation of the tourism industry. As a individualized service, interactive system can actively push the content that users may be interested in, reducing the burden of users looking for needed information. Intelligent tourism will provide ubiquitous tourism information service for individual tourists, which is different from traditional tourism information that is isolated, scattered and disconnected. Intelligent tourism information service can provide accurate and real-time tourism data and information resources at any time, place and any media. Information application products and services based on intelligent tourism focus on user experience, providing real-time, on-the-spot, innovative, creative, all-round, systematic and humanized tourism information services for tourists.

Hidaka et al. [4] used the big data analysis technology to analyze and forecast the collected data to determine the congestion situation, waiting time, optimal travel time, etc. of tourist attractions. It uses GPS technology and real-time traffic information to provide real-time navigation and route planning for tourists, in order to avoid congestion and the best travel path. Provide personalized service recommendations and event arrangements for tourists based on their preferences and historical data, in order to improve their satisfaction and experience. Through the above technologies, an on-site itinerary planning support system based on dynamic information of tourist attractions can collect, analyze, predict, and respond to the information of tourist attractions in real-time, providing better services and experiences for tourists, and also improving

the efficiency and efficiency of the tourism industry. Virtual landscape is a virtual environment constructed using computer technology and virtual reality technology, which can simulate the landscape space and ecosystem services in the real world. In virtual landscapes, Lavorel et al. [5] simulated the interaction and response between six ecosystem services under different land use intensities, as well as their impact on landscape spatial sensitivity. These six ecosystem services include water conservation, soil conservation, air purification, climate regulation, biodiversity and cultural services. Under different land use intensities, the interaction and response between these services will change, affecting the sensitivity of landscape space. Through simulation and analysis of virtual landscapes, it is possible to gain a deeper understanding of the interaction and response between six ecosystem services under different land use intensities, as well as their impact on landscape spatial sensitivity. This can provide scientific basis for landscape planning and land use decision-making, promote ecological protection and sustainable development. Intelligent tourism interactive system finds the information that tourists are interested in from the massive tourism information resources, and recommends the individualized demand information to the corresponding tourist users, so the research and growth of interactive system is of great significance to the growth of intelligent tourism. The construction of intelligent information experience centered on tourist experience requires the integration and reconstruction of tourist information, taking a scenic spot and even a city as the product and carrier of information application, and using the methods of interactive design and user experience design to investigate, analyze and prototype tourist users. Aiming at the shortage of traditional tourism information service, this text uses SOM clustering algorithm and CAD technology to improve the interactive design and service of intelligent tourism information, analyzes the historical data of tourists and the interactive behavior between tourists and the system to gain tourists' interest, and combines the interactive information in the Internet era to design the tourism management information system (TMIS) in a collaborative and innovative way to meet the new needs of customers in urban tourism and get new experiences of intelligent tourism.

By combining network information technologies such as human-computer interaction (HCI) and mobile Internet, tourism information can be shared, published and used in time through mobile devices, so as to achieve convenience and intelligence in tourism. Interactive information design has become the link and channel between people and tourism products and services, and the application of people-oriented interactive information design makes the tourism experience more comfortable; Tourism management is more efficient and tourism management is more convenient, and interactive information design plays an irreplaceable role in urban intelligent tourism. Intelligent TMIS collects tourism information flexibly and diversely, mines data according to tourists' personality, and experiences the destination landscape through words, pictures, videos and virtual 3D environment. In order to improve the interactive experience of TMIS, this text mainly does the following work:

⊖ This text combines the development trend of tourism recommendation technology, applies SOM clustering algorithm and CAD technology to intelligent tourism information Interaction design, reasonably designs the structure of information interaction system, and constructs TMIS with tourists' individualized characteristics.

⊖ Currently, there is a general problem of data sparsity in tourism interactive systems, which affects the accuracy of system recommendations. This text introduces a SOM clustering algorithm that can tolerate noise well and has high stability, in order to achieve the construction of TMIS.

⊛ This model obtains the travel time arrangement of users based on their current time series; And in order to alleviate computational pressure, iterative calculation is adopted to obtain recommended results.

This text studies the intelligent tourism information Interaction design and service optimization strategy; By constructing a individualized recommendation model for tourism information, a more interactive user experience can be achieved; The results show the effectiveness of the recommendation model; Finally, a summary of the contributions of the article was made.

2 RELATED WORK

Parametric design has had a significant impact on the concept of landscape design. Parametric design emphasizes the computability and predictability of design, which makes landscape designers pay more attention to the scientific and rational nature of design. At the same time, parametric design also promotes the Digital transformation of landscape design, enabling landscape designers to better cooperate with computer scientists and data scientists, so as to better use digital technology for design and construction. Li [6] analyzed that parametric design has also had a significant impact on the auxiliary means of landscape design. The application of parametric design enables landscape designers to design and modify through computer programs, thereby improving the efficiency and accuracy of design. At the same time, parametric design has also promoted the development of digital tools, such as 3D modeling and virtual reality, providing landscape designers with more comprehensive and intuitive design tools. Ma et al. [7] input the processed data into the SOM clustering algorithm, divide the data into different categories through Analysis of algorithms, such as scenic spots, transportation, catering, etc., and determine the eigenvalue of each category. Based on the results of the SOM clustering algorithm, CAD design is carried out to establish an interactive interface for tourism information, including modules such as maps, routes, catering, accommodation, etc. Each module corresponds to different data categories. According to the results of CAD design, conduct user Interaction design, including user operation interface, interaction mode, information presentation mode, etc., to improve user experience. According to the results of user Interaction design and SOM clustering algorithm, develop intelligent tourism information interaction service strategies, including recommendation system, search system, reservation service, etc., to provide more personalized and intelligent services. Through the above steps, intelligent tourism information Interaction design and service strategy based on SOM clustering algorithm and CAD can be realized. This strategy can provide more personalized and intelligent services, improve the efficiency of tourism information usage and user satisfaction. Personalized intelligent Interaction design and service of tourism information refers to personalized recommendation, customized service and intelligent Interaction design of tourism information through big data analysis, artificial intelligence and other technologies to meet the personalized needs and preferences of different tourists. Through personalized intelligent tourism information Interaction design and service, it can better meet the personalized needs and preferences of tourists, improve the service quality and efficiency of the tourism industry, and enhance the tourism experience and satisfaction of tourists. At the same time, it can also promote innovation and upgrading of the tourism industry, providing important support and guarantee for the sustainable development of the tourism industry. Pencarelli [8] utilizes technologies such as artificial intelligence and virtual reality to design intelligent interactive interfaces and experiences, such as intelligent customer service and virtual tourism, to improve the tourism experience and satisfaction of tourists. The digital revolution in the tourism industry refers to the use of digital technology and intelligent means to innovate and upgrade various fields of the tourism industry. Among them, personalized intelligent tourism information Interaction design and services are an important part of the digital revolution. Shan and Sun [9] use virtual reality technology to design in a virtual environment and view the design results in real-time. This can help designers quickly adjust design plans and improve design efficiency. It creates a virtual environment in Lumion, where designers can design and adjust their solutions by viewing the design effects in real-time. This not only improves design efficiency, but also reduces errors and repetitive work. In Lumion, details can be optimized by adjusting parameters such as material, color, and lighting to make the scene more realistic and refined. In addition, Lumion also supports plant libraries and vegetation tools, allowing designers to easily add and adjust plants, thereby optimizing the details of the landscape. Through Lumion, customers can conduct interactive visits in a virtual environment and experience future design effects. This can make customers more understand and satisfied with the design scheme, and also help designers better showcase and exchange design ideas.

Shan and Sun [10] convert the collected data into a 3D model and use GIS software for modeling and analysis. The 3D model can realistically present the appearance and internal structure of Urban tourism landscape, and provide interactive operation and browsing. According

to the characteristics and actual needs of Urban tourism landscape, determine the corresponding evaluation indicators, such as landscape characteristics, environmental quality, tourism services, transportation convenience, etc. The data is analyzed and evaluated through GIS software, and the Urban tourism landscape is comprehensively evaluated according to the evaluation indicators. Various data analysis tools and algorithms can be used to evaluate Urban tourism landscape quantitatively and qualitatively. According to the evaluation results, optimize the design of Urban tourism landscape, put forward improvement suggestions and schemes, and improve the quality and attractiveness of Urban tourism landscape. The research on 3D Urban tourism landscape design and evaluation based on GIS can provide scientific basis and decision support for Urban tourism planning and construction, and promote the sustainable development of Urban tourism industry. CAD, SketchUp and PS are commonly used Computer-aided design software in landscape planning and design. Their integrated application can greatly improve the efficiency and quality of landscape planning and design. CAD can be used to draw various graphics and charts in landscape planning and design, including terrain, architecture, roads, plants, water systems, etc. Song and Jing [11] quickly complete various complex design tasks through the drawing function of CAD. At the same time, it can also accurately locate the dimensions and coordinates of the design, ensuring the accuracy and feasibility of the design. Through the modeling function of SketchUp, designers can design in three-dimensional space and more intuitively feel the effectiveness and rationality of the design. At the same time, SketchUp also provides various tools and plugins that allow designers to quickly perform modeling, rendering, animation, and other operations, greatly improving design efficiency. Through the integrated application of these software, designers can more efficiently complete various complex design tasks, while also improving the quality and visualization of the design, making customers more understand and satisfied with the design solution. Wang [12] can effectively extract features from tourism product information through deep learning-based classification processing. And learn the interaction between features to improve the accuracy and efficiency of classification and prediction of tourism product information. At the same time, this method can also flexibly adjust and optimize according to different tourism scenarios and needs, providing important support and reference for tourism planning and decision-making. In today's digital age, personalized recommendation technology has become an important means for various industries to improve customer experience and conversion efficiency. In the tourism industry, providing customized tourism products and services to tourists through personalized recommendation technology can significantly enhance customer stickiness and improve the conversion efficiency from online to offline platforms. Wang [13] has designed a personalized recommendation framework for online travel. Personalized recommendation technology is based on user behavior and interests, forming a personalized recommendation system through data analysis and prediction. This system can recommend corresponding tourism products and services based on the unique needs and preferences of each tourist, thereby improving tourist satisfaction and stickiness. In online marketing of tourism products and offline store navigation, personalized recommendation technology can play a variety of application scenarios. For example, recommend suitable tourist destinations and products based on tourists' historical consumption records and preferences. In tourism event planning, recommend relevant activities and products based on seasons and themes. In the store guide, personalized travel route planning and recommendations are provided based on users' interests and needs. Designers can choose different plant species and colors in the system according to customer needs, and create landscape plans that meet the requirements. At the same time, computer-aided collaborative design systems can also be optimized through data analysis and optimization. Xu and Wang [14] further optimized and improved the design scheme to achieve the best landscape effect. Secondly, computer-aided collaborative design systems can also achieve visualization effects, allowing customers to more intuitively experience the effects of landscape design. Through the virtual reality technology of the system, the designed landscape plan can be presented in three-dimensional form, and customers can observe the landscape effect from different perspectives and distances, thereby better understanding the designer's intentions and plans. Finally, computer-aided collaborative design systems can also improve design efficiency and collaboration

capabilities. Designers can share designs and modify solutions in real-time within the system, and customers can also participate in the design process to provide their own opinions and suggestions, in order to better meet customer needs. At the same time, the system can also manage and analyze the design scheme data, providing reference and support for subsequent landscape maintenance and management.

In CAD collaborative information behavior, roles refer to the responsibilities and tasks undertaken in collaborative work. Taking Chinese team tourism as an example, team tourism needs to collect various information, including scenic spot information, transportation information, accommodation information, catering information, etc., and organize and classify this information. Ye et al. [15] conducted data analysis on the collected information, including tourism trends, attraction evaluations, price trends, etc., in order to better formulate tourism plans and budgets. Develop a travel plan based on team needs and constraints, including itinerary arrangements, accommodation arrangements, catering arrangements, etc., and coordinate and communicate with team members. Based on feedback and evaluations from team members, make improvements and adjustments to the travel plan to improve the quality of travel and user experience. In the collaborative information behavior of CAD, the role of information processing and management is very important. They need to ensure the accuracy and completeness of information, and also coordinate communication and cooperation among team members to ensure the smooth implementation of tourism plans. In addition, they also need to manage and analyze tourism data to provide support for the team's tourism decision-making and improve the effectiveness and efficiency of tourism. The process innovation capability in tourism planning based on SOM clustering algorithm can utilize advanced algorithms and team collaboration to improve the efficiency and quality of tourism planning, as well as enhance tourism experience and satisfaction. Yeh and Ku [16] improve various aspects of the tourism process, improve tourism efficiency and quality, and reduce time and labor costs in tourism. The impact of team collaboration performance on tourism planning: Team collaboration performance refers to the collaboration and communication skills between team members. In tourism planning, team collaboration performance can help teams better coordinate and collaborate, improving the efficiency and quality of tourism planning. For example, team members can better solve problems and challenges encountered in tourism, improve travel experience and satisfaction through good communication and collaboration. The impact of knowledge exchange platforms on tourism planning: Knowledge exchange platforms can help team members exchange knowledge and experience, improving the efficiency and quality of tourism planning. For example, team members can better solve the problems and challenges encountered in tourism by sharing tourism experience and knowledge on a knowledge exchange platform, thereby improving the tourism experience and satisfaction. The optimization of hierarchical details is another important application of 3D CAD in landscape design. By adjusting the different levels of detail in the model, the precision and computational efficiency of the model can be controlled to meet different design requirements. For example, in the preliminary design stage, simple geometry can be used to quickly create a rough model, while in the detailed design stage, more details and refinement can be gradually added to achieve higher design accuracy. Zhao [17] uses an internal dynamic optical reflection algorithm to calculate the reflection and scattering effects of water on light, thereby achieving the internal dynamic optical reflection effect of water. The implementation of this technical solution requires strong computing power and high-precision model data, which can be applied to fields such as games, movies, virtual reality, etc., providing a more realistic environment and visual effects.

3 INTERACTIVE DESIGN AND SERVICE STRATEGY OF INTELLIGENT TOURISM INFORMATION

3.1 Tourism Information Mining

As an important part of smart cities, intelligent tourism has changed the pattern and mode of traditional tourism, and more independent tourism mode has also put forward new requirements

for intelligent tourism in cities. This text puts forward to improve the interactive design and service of intelligent tourism information with the help of CAD technology, aiming at conforming to the principle of taking tourists' needs as the center in intelligent tourism, enhancing tourists' autonomy and interaction in tourism activities, and providing tourists with convenient and individualized tourism information services. Figure 1 is the integrated architecture of tourism information interactive system based on SOM clustering algorithm and CAD.

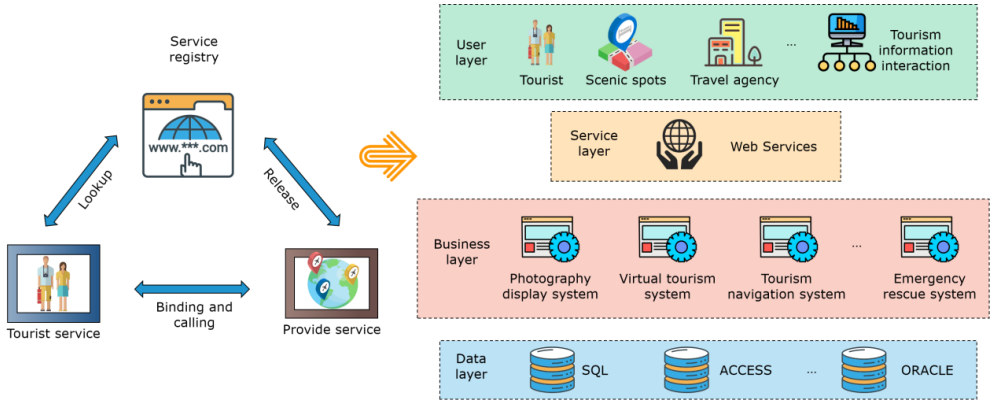

Figure 1: Integrated architecture of tourism information interaction system.

Intelligent tourism is the product of cross-border integration of tourism industry and sci & tech innovation, and it is also the advanced stage of tourism industry development. Intelligent tourism is not a simple extension of traditional tourism service, but a brand-new service concept, which will certainly bring people a brand-new tourism service experience.

$$W = A \bigcup B \bigcup C \tag{1}$$

$$y = f\left(x_1, x_2\right) = a_0 + a_1 x_1 + a_2 x_2 + a_3 x_1^2 + a_4 x_2^2 + a_5 x_1 x_2 \tag{2}$$

Consider different monomials as m input models in the initial system of the modeling network:

$$v_1 = a_0,\ v_2 = a_1 x_1,\ v_3 = a_2 x_2, \ldots,\ v_6 = a_5 x_1 x_2 \tag{3}$$

Constructing the first-level intermediate model:

$$z_k = f_k\left(v_i, v_j\right), i, = 1,2,\ldots,6 \tag{4}$$

As the first leap of tourism informatization, tourism intelligence is based on intelligent system, that is, an intelligent solution set formed by computer, communication technology, network technology and intelligent control technology for a specific problem. The elements of mobile information service include information server, information user and information service content. Information service providers publish tourism information on the information platform, and tourists, as information users, get the required content on the information platform and give feedback in a certain way. The information service system analyzes the essential characteristics, information needs and information behavior characteristics of users through the collected mobile information.

For the j element, the calculation method of the mean and variance is:

$$\begin{cases} \overline{X}_j = \dfrac{1}{m}\sum_{i=1}^{m} X_{ij} & \left(i = 1,2,\ldots,N\right) \\ S_i^2 = \dfrac{1}{m-1}\sum_{i=1}^{m}\left(X_{ij} - \overline{X}_j\right)^2 & \left(i = 1,2,\ldots,N\right) \end{cases} \tag{5}$$

The coefficient of change of each index is:

$$V_j = \frac{S_j}{X_j} \tag{6}$$

Normalize the coefficient of change to get the weight of each index:

$$W_j = \frac{V_j}{\sum_{j=1}^{n} V_j} \tag{7}$$

Tourism intelligence mainly solves the problems of the structure and relationship of various elements in the tourism industry, which is conducive to the effective allocation of resources and the efficient operation of the system. Intelligent tourism is not only the second leap of tourism informatization, but also the latest form of intelligent tourism under the constraints of current sci & tech level. In the stage of promoting and developing tourism informatization, a large quantity of information barriers and information islands have been formed by the division of various departments in the industry. The information obtained by tourists is isolated, scattered and one-sided. It is urgent to fundamentally break the split or even antagonistic relationship between various network platforms and information systems and establish new information communication channels and service mechanisms. In the whole stage of service design, modern network AI is used to fully understand the characteristics of user's operation behavior, and through the sharing and monitoring of information platform, the information content contacted by users in each link is effectively integrated and coordinated, and an information service system is established to ensure the rationality of service design and the fluency of delivering service value.

3.2 Individualized Recommendation Model of Tourism Information

Tourism informatization is the starting point and cornerstone of the growth of intelligent tourism. With tourism information as the core, information network as the foundation, and AI as the leading factor, the traditional tourism industry is integrated in terms of production, distribution and consumption, so as to improve the level and efficiency of tourism services and increase the overall benefits of tourism. After the tourist interest model is established, the interactive system needs to use the recommendation algorithm to analyze and process the data for individualized recommendation of tourists. Tourists constantly interact with the smart scenic spot system, which makes the service form and consumption content of the scenic spot innovate constantly. Tourists have different experiences and feelings every time they come, so they are willing to repeat consumption. The working principle of intelligent tourism information interactive system is shown in Figure 2.

Collaborative network refers to a network system that is composed of many networks with different properties and structures for a specific purpose and can produce synergistic effects. It forms a unified whole with the environment through the exchange of energy, material and information, and has complex, open, dynamic and self-organizing ecological characteristics. The evolution of intelligent tourism service is the participation of tourists, tourism agents, tourism factor providers and other service factors such as scenic spots, hotels, transportation, restaurants, shopping, etc., which promotes the innovation and functional growth of intelligent tourism under the support of network platform and the joint action of internal and external environment. Collaborative network is not an isolated system, it always exchanges energy, material and information with the external environment. These new external factors introduced promote the fluctuation of the system, from imbalance and chaos to stability and order. It has the dissipative structure of the ecosystem and can self-organize evolution. In this text, SOM calculation is used to obtain the importance ranking of multiple influencing factors, and several relatively important influencing factors are selected to construct a comprehensive evaluation model of scenic spots. Use A, B and C to represent the selected factors.

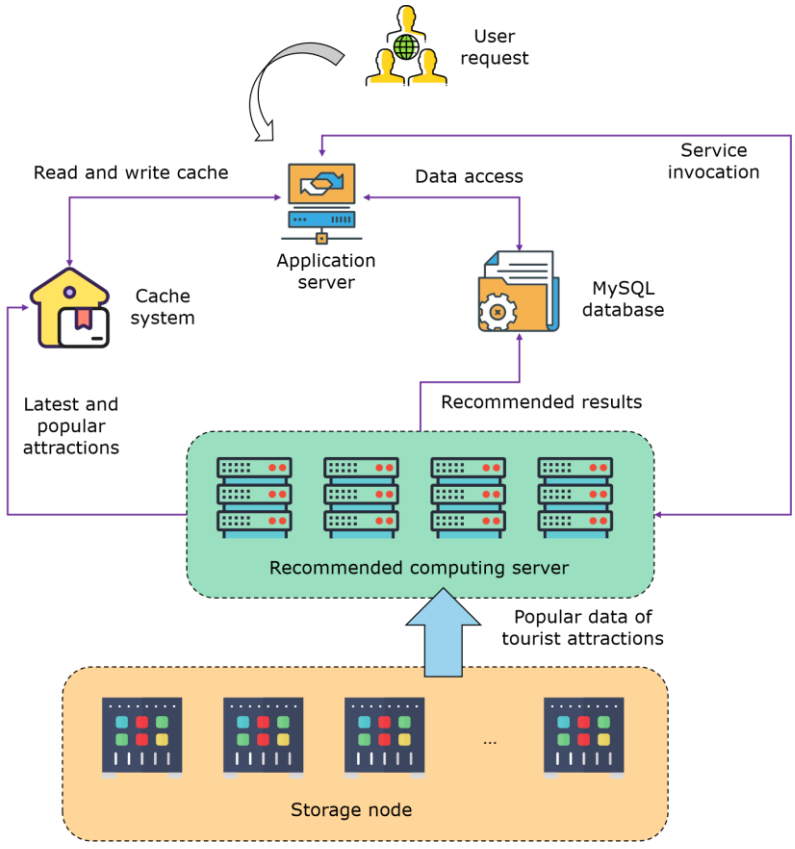

Figure 2: Intelligent tourism information interactive system.

If the relationship between the target and the index is proportional, there are:

$$a_i = \frac{A_i}{\sum_{i=1}^{n}(A_i / n)} \tag{8}$$

If the relationship between targets and indicators is inversely proportional, there are:

$$a_i = \frac{\sum_{i=1}^{n}(A_i / n)}{A_i} \tag{9}$$

By analogy, b_i and c_i can be obtained respectively. Then the calculation expression for constructing the comprehensive evaluation model of scenic spots is as follows:

$$Z_i = (\alpha * a_i + \beta * b_i + \gamma * c_i) * 100\% \tag{10}$$

Among them, a_i, b_i and c_i represent the relative scores of the i th scenic spot on the influencing factors A, B and C; Z_i is the comprehensive evaluation score of the i th scenic

spot; α, β, and γ are the weights of the ith scenic spot influencing factors A, B and C respectively.

In SOM algorithm, there will be the adjustment stage of network weight vector, that is, cooperative process and adaptive process, so as to reflect the interaction behavior between users and the dynamic changes of the overall design scheme during the interaction process. From the perspective of open design process, with user interaction and iteration, the design scheme dynamically evolves and gradually converges, and a relatively complete and rational product design scheme is obtained. In SOM neural network, with the progress of training and the gradual adjustment of weights, the network of the output layer is constantly changing to the final convergence. The probability preservation of SOM algorithm takes the user's design scheme as the input vector.

The main function of SOM network model is to map the input high-dimensional spatial data into a low-dimensional output, while retaining the topological relationship of the original data set. SOM neural network can adjust the weight vector by repeatedly learning the input pattern, so that it tends to be consistent with the probability distribution of the input pattern, that is, the probability keeps the line. When scoring and forecasting the target scenic spot, find the same features as the target scenic spot according to the data source of scenic spot features. In the collection of attractions, the attractions with the same characteristics are stored in the collection I. Similarity based on attraction ratings can be calculated using the following formula:

$$Sim_I(s,t)=\frac{\sum_{s,t\in I,u\in U}\left(R_{u,s}-\overline{R}_s\right)\left(R_{u,t}-\overline{R}_t\right)}{\sqrt{\sum_{s,t\in I,u\in U}\left(R_{u,s}-\overline{R}_s\right)^2}\sqrt{\sum_{s,t\in I,u\in U}\left(R_{u,t}-\overline{R}_t\right)^2}} \tag{11}$$

Among them, s represents the target scenic spot; U is the set of users who have shared scores on the scenic spot (s,t). $R_{u,s}$ represents the user u's rating of the scenic spot s. $\overline{R}$ represents the average rating of the scenic spot s by the user U. In this text, considering the comprehensive influence of scenic spot score and scenic spot attribute on the final similarity calculation, the global similarity of scenic spot projects is calculated by combining the scenic spot score similarity and project attribute similarity through weight parameters. Its calculation formula is as follows:

$$Sim'(I_i,I_j)=\mu_p Sim_I(I_i,I_j)+\mu_a Sim_a(I_i,I_j) \tag{12}$$

Among them, μ_a represents the similarity control parameter of the attribute dimension of the scenic spot; μ_p represents the similarity control parameter of the traditional score of the scenic spot.

In order to better organize and manage tourism thematic information, provide convenient and fast tourist attractions search, scenic surrounding environment and 3D landscape information services, and improve the efficiency and informatization level of tourism information management, it is needed to establish a intelligent TMIS with visualization on a map in the whole region, so as to provide a service-oriented information publishing and analysis platform for tourism business. The design of the system not only meets the current functional requirements, but also connects with the future, leaving room for later management and development. Through vertical search technology and collaborative interactive system to meet the needs of tourists customized travel notes. With the cooperation of related tourism network service platforms, users can book and purchase tourism products conveniently and quickly, and realize online trading of food, accommodation, parade and entertainment.

4 SIMULATION EXPERIMENT AND RESULT ANALYSIS

In the design of tourism information service, by exploring the user demand and functional demand of tourists before, during and after the tour, we can find out the pain points of users, find the nodes of functional demand, draw the service contact points into a service blueprint according to the user service process, integrate them into the network information service platform according to the functional needs of users at different levels, and design an interactive interface to provide tourism information interactive services for tourists. In order to verify the performance and effectiveness of the improved algorithm, numerical data are used as experimental verification in the experimental process, and the algorithm is implemented under Matlab platform. The parameter settings of the simulation test environment are shown in Table 1.

Serial number	*Test parameters*	*Install*
1	Language	JAVA
2	Database	SQL Server
3	Webpage	AJAX
4	Hard disc	1T
5	Display card	NVIDIA GeForce RTX 3070
6	CPU	Intel Core i7 13700K
7	Operating system	Windows 11

Table 1: Test environment parameter settings.

The intelligent tourism service system takes users' needs as the main goal, provides them with customized tourism experiences that meet their interests and preferences, actively or passively perceives the characteristics of tourists' needs in the whole stage of tourism, systematically and deeply integrates various tourism resources, and purposefully selects suitable tourism service items for tourists, thus promoting the intelligent interaction between tourists and smart devices. In this text, the algorithm has been trained many times, and the result of error changing with noise is shown in Figure 3.

Figure 3: Variation of training set error with noise.

The convergence speed of this algorithm is faster. In a general interactive system, a user may only rate and operate a few items. For most users, their user preference vectors are mostly filled with

zero elements. In fact, these so-called zero-filled locations are missing data. If these incomplete data are artificially regarded as zero elements, it will have an impact on the clustering results. F1 is a measure in the field of statistics. It is a weighted harmonic average of accuracy and coverage. In interactive system, the comprehensive index of the two usually indicates the performance of recommendation model. The formula is as follows:

$$F1 = \frac{2 \times \text{Coverage} \times \text{Precision}}{\text{Coverage} + \text{Precision}} \tag{11}$$

The comparison result of F1 value is shown in Figure 4. The recommendation accuracy of the system is shown in Figure 5.

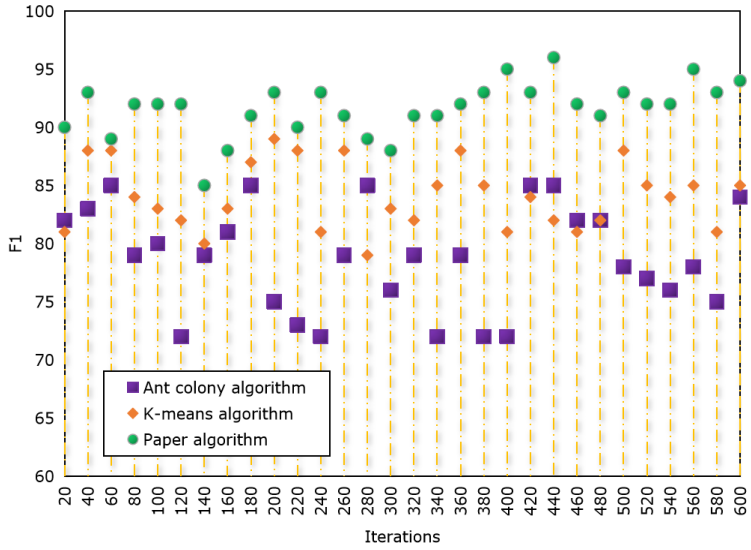

Figure 4: Comparison of F1 values of different algorithms.

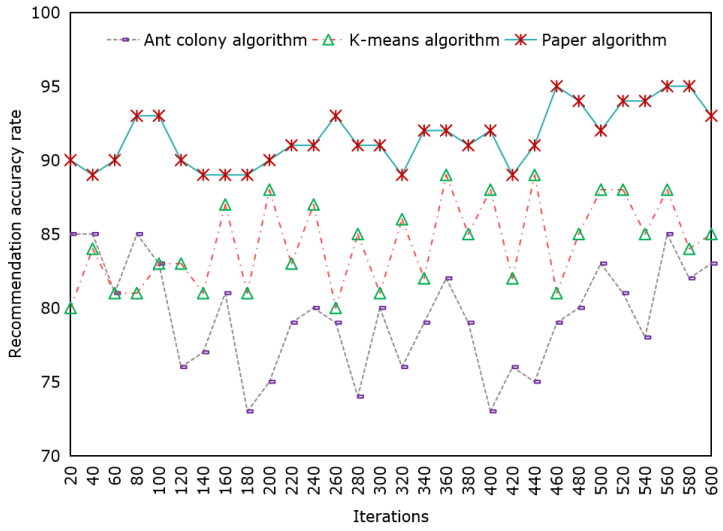

Figure 5: Recommendation accuracy of different systems.

In the data set, the F1 value of this algorithm is not only higher than other models, but also its recommendation accuracy is greatly improved compared with other systems. In this text, the classification label data is used as the training data of SOM clustering algorithm, and the obtained fuzzy classification model can classify new samples with high accuracy, which fully shows the feasibility of SOM clustering algorithm proposed in this text.

The promotion of tourism knowledge to the evolution of intelligent tourism service is mainly reflected in the growth of potential tourism demand, the growth of tourist attractions and the improvement of tourism service quality. Several different systems are compared, and the operating efficiency of different systems is shown in Figure 6.

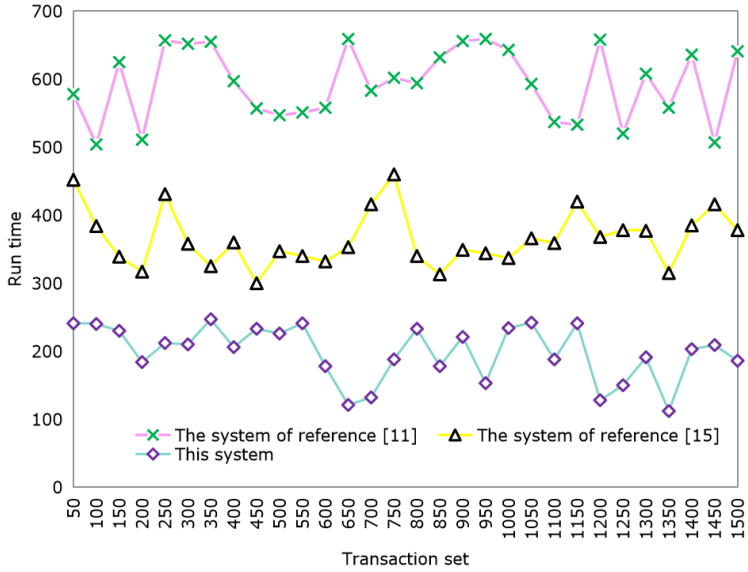

Figure 6: Comparison of operating efficiency of different systems.

It can be seen that the operation efficiency of this system is high, and it takes less time. System stability refers to the probability of error in the continuous operation time under its own operating environment. System stability is determined by both software and hardware. Under the condition of certain hardware environment, good architecture and standardized development process are the basis to ensure software stability. The stability of different systems is tested at the same time, and the results are shown in Figure 7.

Many experiments have been carried out in this section, and the results show that the stability of the system is about 95% under normal circumstances, and the highest recommendation accuracy rate can reach above 94%. Moreover, it realizes the processing function of daily business. The model provides a intelligent tourism solution, realizes the real-time sense of tourism environment, the integration of thematic information and the interaction of tourism management services, and meets the tourist information needs conveniently and comfortably. Visitors can experience information interaction and visual information presentation in tourist attractions at any time. For example, the use of architectural projection technology to combine dynamic images with buildings to create artistic forms. Its function can not only create an environment for visual interaction between people and space, but also endow people with the process of communication and interaction with dynamic words, images and images, which itself endows them with more emotional connotations.

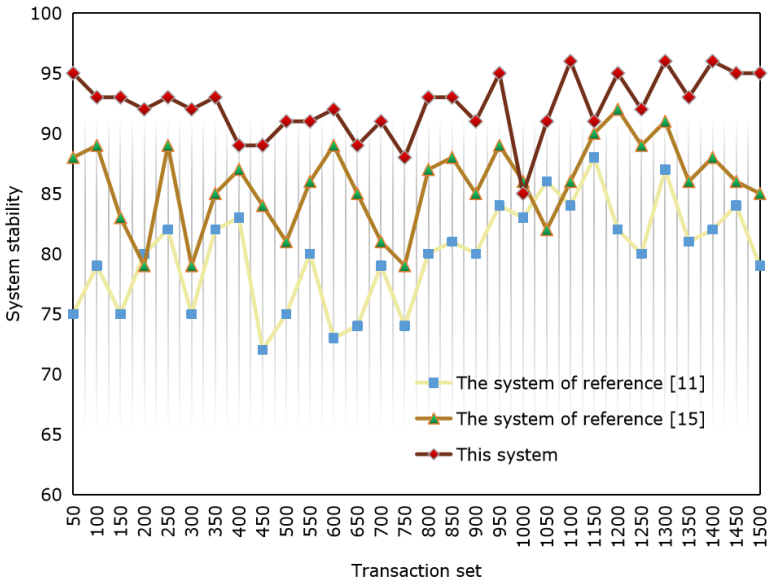

Figure 7: Comparison of stability test results of different systems.

5 CONCLUSIONS

Interactive information design has become the link and channel between people and tourism products and services, and the application of people-oriented interactive information design makes the tourism experience more comfortable. This text proposes to improve the interactive design and service of intelligent tourism information with the help of CAD, constructs the operation mechanism of HCI-based intelligent tourism elements collaborative service mode. The main function of SOM network model is to map the input high-dimensional spatial data into a low-dimensional output, while retaining the topological relationship of the original data set. The simulation shows that the stability of the system is around 95%, and the highest recommendation accuracy can reach above 94%. Tourism knowledge not only includes tourism information, tourism resources, tourism operation and other directly related knowledge, but also includes external knowledge such as tourism policy, tourism environment, social culture and so on. The promotion of tourism knowledge to the evolution of intelligent tourism service is mainly reflected in the growth of potential tourism demand, the growth of tourist attractions and the improvement of tourism service quality. This model provides a intelligent tourism solution, which realizes the real-time sense of tourism environment, the integration of thematic information and the interaction of tourism management services, and meets the tourism information needs of tourists conveniently and comfortably.

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